CLAIMS

1. A method of selecting the tap weights W_N for an adaptive multi-tap frequency domain digital filter that processes an input signal vector X from a plurality of spatially separated transducers that detect energy from a plurality of sources including a target energy source and at least one non-target energy source, wherein the filter receives and processes the input signal vector X to attenuate noise from non-target sources and provides an output signal vector Y, the method comprising the steps of:

parameterizing each of the tap weights W_N such that each of the tap weights W_N is characterized by a vector of parameters $\underline{\beta}_{opt}$;

solving for each parameter of the vector $\underline{\beta}_{opt}$ by minimizing the expected power of the array output signal Y;

applying a robustness-control transformation to the vector $\underline{\beta}_{opt}$ to provide a robust vector $\underline{\beta}_{rob}$, wherein the robustness-control transformation identifies and reduces target canceling components of the vector $\underline{\beta}_{opt}$ that arise from incomplete target location knowledge while preserving non-target canceling components; and

forming the weight vector indicative of the filter tap weights as a function of the vector $\underline{\beta}_{rob}$.

2. A signal processing apparatus that receives an input signal vector X from a plurality of spatially separated transducers that detect energy from a plurality of sources including a target energy source and at least one non-target energy source, wherein the apparatus processes the input signal vector X with a digital filter comprising a plurality of tap weights W_N to attenuate signal noise from non-target sources and provide a resultant output signal vector Y, said apparatus comprising:

means for parameterizing each of said tap weights W_N such that each of said tap weights

W_N is characterized by a vector of parameters $\underline{\beta}_{opt}$;

means for solving for each parameter of the vector $\underline{\beta}_{opt}$ by seeking a minimum for the expected power of the output signal Y;

means for applying a robustness-control transformation to the vector $\underline{\beta}_{opt}$ to provide a robust vector $\underline{\beta}_{rob}$, wherein the robustness-control transformation identifies and reduces target canceling components of the vector $\underline{\beta}_{opt}$ that arise from incomplete target location knowledge while preserving non-target canceling components; and

means for forming a weight vector indicative of the tap weights as a function of the vector $\underline{\beta}_{rob}$.